

Appendix C Soil Identification Resources

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References

- U.S. Department of Agriculture, Natural Resources Conservation Service. 2016. *Field Indicators of Hydric Soils in the United States*, Version 8.0. L.M. Vasilas, G.W. Hurt, and J.F. Berkowitz (eds.). USDA, NRCS, in cooperation with the National Technical Committee for Hydric Soils.
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_053171.pdf
- U.S. Department of Agriculture, Natural Resources Conservation Service. Soils References webpage. <https://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/ref/>

Examples of Common Field Indicators of Hydric Soils, Version 7.0*

Indicator Type	Description	Colors	Note
A1, Histosol	≥ 16 inches of the upper 32 inches is organic material		Classifies as a Histosol
A2, Histic Epipedon	A histic epipedon, ≥ 8 inches of organic material underlain by mineral soil with low chroma	Chroma 2 or less	
A10, 2cm Muck	≥ 0.75 inches muck layer starting within the upper 6 inches	Value 3 or less Chroma 1 or less	
A11, Depleted Below Dark Surface	A layer with a depleted matrix (DM) or gleyed matrix starting within 12 inches of the soil surface that has a minimum thickness of 6 inches.	DM is ≥ 60%, chroma 2 or less; gleyed matrix, layers above must be color 3/21 or less, 3/1 or less for sands	Previously F4. For Fragmental and sandy soil material refer to Version 6.0
A12, Thick Dark Surface	A layer with a DM or gleyed matrix, ≥ 6 inches thick starting below 12 inches of the soil surface. Dark surface: upper 12 inches is 2.5/1 or less and remainder is 3/1 or less	DM is ≥ 60%, chroma 2 or less; gleyed matrix	Previously F5. For sandy soils refer to Version 6.0
S1, Sandy Mucky Mineral	≥ 2 inches of mucky modified sandy mineral layer starting within the upper 6 inches		“mucky” is a USDA texture modifier for mineral soils
F1, Loamy Mucky Mineral	≥ 4 inches of mucky modified mineral layer starting within the upper 6 inches		
F3, Depleted Matrix	A DM is either: ≥ 2 inch thick within the upper 6 inches or ≥ 6 inch thick starting within the upper 10 inches	≥ 60% chroma 2 or less	E horizons without RC are excluded; refer to Version 6.0
F6, Redox Dark Surface	≥ 4 inch thick layer entirely within the upper 12 inches of mineral soil. All redox concentrations (RC) must be distinct or prominent.	3/1 or less and ≥ 2% RC or 3/2 or less and ≥ 5% RC	RC are the reddish, brownish and yellowish colors (previously called mottles)

NOTE – For all depleted matrixes, RC are required for: 4/1, 4/2, and 5/2 matrix colors.

* Refer to the latest version of the NRCS Field Indicators of Hydric Soils for official use.

Informal Key for Hydric Soil Decisions in Indiana, Sept. 2012

See *Field Indicators of Hydric Soils in the United States* (v. 8.0) for details.

This key is written to help navigate *Field Indicators of Hydric Soils in the United States* (v. 8.0).

1. Does the top layer the top layer have a dominant chroma >2 and is more than 6 inches thick?
YES = you will not make any indicator
NO = go to 2
2. Is the soil muck? Muck is sapric organic soil material in which virtually all of the organic material is so decomposed that identification of plant forms is not possible:
YES = go to 3
NO = go to 7

All soils, mainly thick organic matter accumulation.

3. Is the soil a Histosol (16 inches of organic material in the top 32 inches)?
YES = hydric (**A1**)
NO = go to 4
4. Is there a layer of muck ≥ 2 centimeters starting within 6 inches of the soil surface?
YES = go to 5
NO = go to 6
5. Is there a layer of muck ≥ 8 inches thick starting within 6 inches of the soil surface?
YES = hydric (**A2**)
NO = hydric (**A10**) in LRR M and N
6. Are there several stratified layers within 6 inches of the soil surface and 1 or more layers ($\leq 3/1$) and/or is muck or mucky modifier?
YES = hydric (**A5**)
NO = go to 7
7. Is the top 10 inches of the soil loamy sand or coarser? This includes lfs, ls, lcos, vfs, fs, s and cos.
YES = got to 8
NO = go to 13

Sandy soils (loamy fine sand and coarser). These include lfs, ls, lcos, vfs, fs, s and cos.

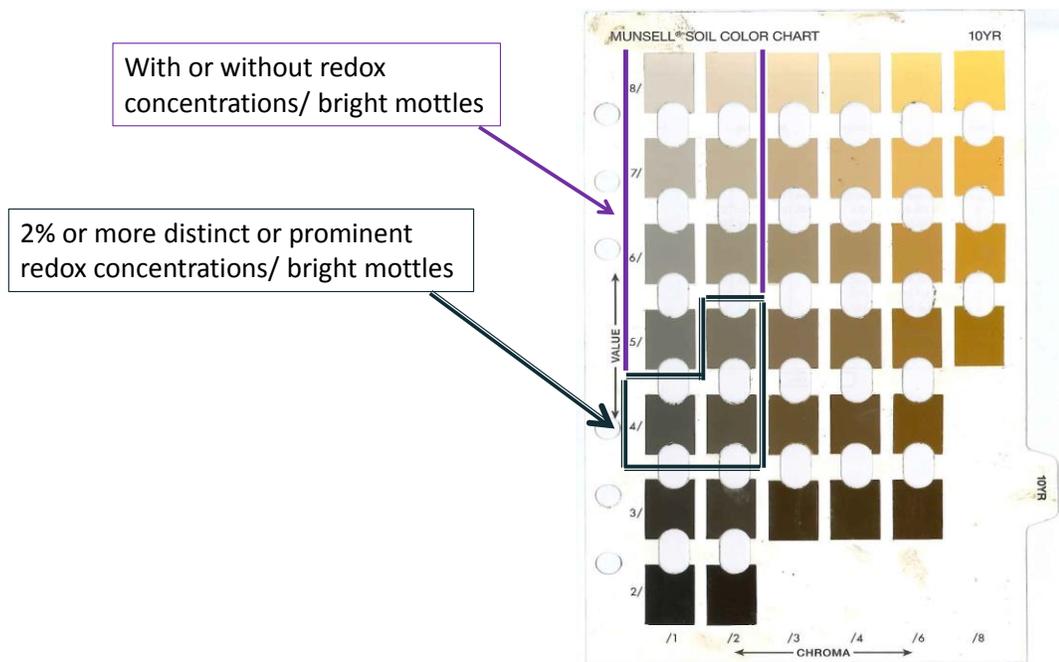
8. Is there ≥ 2 inches of mucky sand within the upper 6 inches of the soil?
YES = hydric (**S1**)
NO = go to 9
9. Is there ≥ 2 inches of mucky peat or peat within the top 6 inches of soil with (value/chroma of 3/2 or darker)?
YES = hydric (**S3**) in LRR M
NO = go to 10

10. Is there a layer with $\geq 60\%$ gley page colors within the upper 6 inches of the soil?
 YES = hydric (**S4**)
 NO = go to 11
11. Is there a ≥ 4 inch thick layer within 6 inches of the soil surface with $\geq 2\%$ bright mottles? The matrix chroma is ≤ 2 (any value) and the mottles are distinct or prominent.
 YES = hydric (**S5**)
 NO = go to 12
12. Within the upper 6 inches of the soil surface is there a layer or gray splotchy colors, with Value 5 or more? [no thickness requirement]
 YES = hydric (**S5**)
 NO = go to 13
- Loamy and fine soils (loamy very fine sand and finer). Includes: loamy very fine sand, sandy loams, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay and clay)
13. Does the soil have a **Depleted Matrix*** immediately below the topsoil with any of the combinations of topsoil depths and colors described in Table 1 & Figure 1 below?
 YES = hydric
 NO = go to 14

Table 1. For Soils with a Depleted Matrix immediately below the topsoil

Depth to the Top of Layer with Depleted Matrix	Required Thickness of DM	Value/ Chroma of topsoil above DM	NRCS Field Indicator
1 to 4 inches	2 inches	Any	F3
4 to 6 inches	6 inches	Any	F3
> 6 to 10 inches	6 inches	3/2 or darker, but up to 6 inches of the topsoil can be any color	F3
> 10 to 12 inches	6 inches	3/2 or darker	A11
> 12 inches	6 inches	Top foot is 2.5/1 or darker and below is 3/1 or darker	A12

*A **Depleted Matrix** is a layer with dominantly gray colors, usually with bright mottles, in combinations per Figure 1. Matrix colors are in the upper left side of the color chart (4/2 and upward to the left). Applies to other color charts, also (e.g., 2.5Y, 5Y, 7.5YR, etc.). Mottles, if required, are red or brown (redox concentrations); at least 2% abundance; and are distinct or prominent. Mottles are required for color chips 4/1, 4/2, and 5/2. Mottles are optional for color chips 5-8/1 and 6-8/2. The Depleted Matrix is for use with Loamy and Clayey textured soils.



14. Is there ≥ 4 inches thick with “mucky” organic matter content (for example, mucky loam, mucky silt loam, mucky silty clay loam, etc.) starting within 6 inches of the soil surface?
 YES = hydric (**F1**) except LRR N
 NO = go to 15

15. Does the topsoil (3/2 or darker) have a mottled layer ≥ 4 inches thick all within the top 12 inches of the soil, with an of the combinations of topsoil colors and mottle abundances described in Table 2 below?

Table 2. For Soils with Mottles in the top foot of a dark topsoil

Topsoil Matrix Value/Chroma	Percent red mottles (Fe concentrations) (distinct or prominent)	Percent gray mottles (Fe Depletions) Value ≥ 5 /Chroma ≤ 2
3/1 or darker	2 percent (F6)	10 percent (F7)
3/2 or darker	5 percent (F6)	20 percent (F7)

YES = hydric
 NO = go to 16

16. Is there a layer with $\geq 60\%$ gley page colors within the upper 12 inches of the soil surface?
 YES = hydric (**F2**)
 NO = go to 17

17. Is the soil in a closed depression subject to ponding AND there are $\geq 5\%$ bright distinct or prominent mottles (redox concentrations) in a layer 2 inches thick entirely in the top 6 inches of the soil?
 YES = hydric (**F8**)

Notes: Redox Features Types and Location

Concentrations (C) are those redox features that have a chroma of 3 or higher.

Depletions (D) are those redox features that have a chroma of 2 or less.

Generally the redox features will be found in the matrix (M).

NOTES: Texture

Coarse sand – cos

Sand – s

Fine sand – fs

Very fine sand – vfs

Loamy coarse sand – lcos

Loamy sand - ls

Loamy find sand - lfs

Loamy very fine sand – lvfs

Coarse loamy sand – cosl

Sandy loam – sl

Fine sandy loam – fsl

Very fine sandy loam – vfst

Loam – l

Silt loam - sil

Silt – si

Sandy clay loam – scl

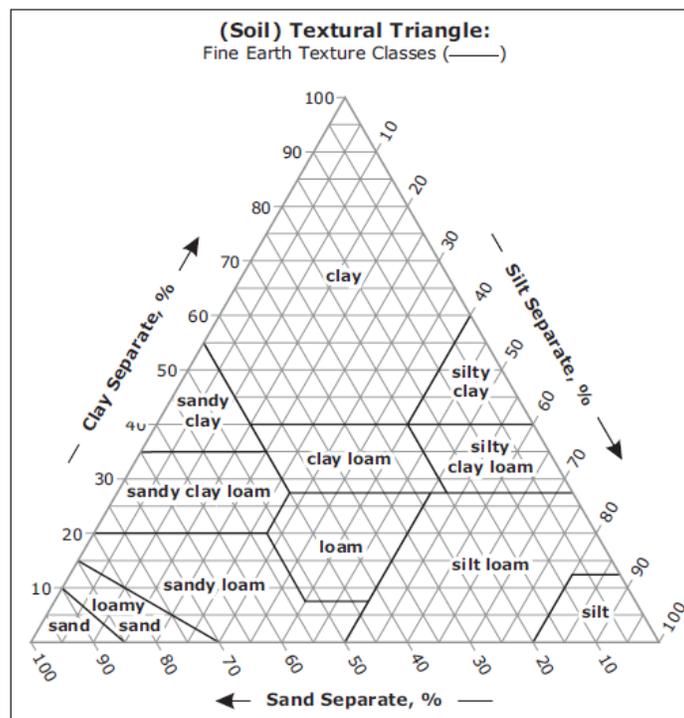
Clay loam – cl

Silty clay loam – sicl

Sandy clay – sc

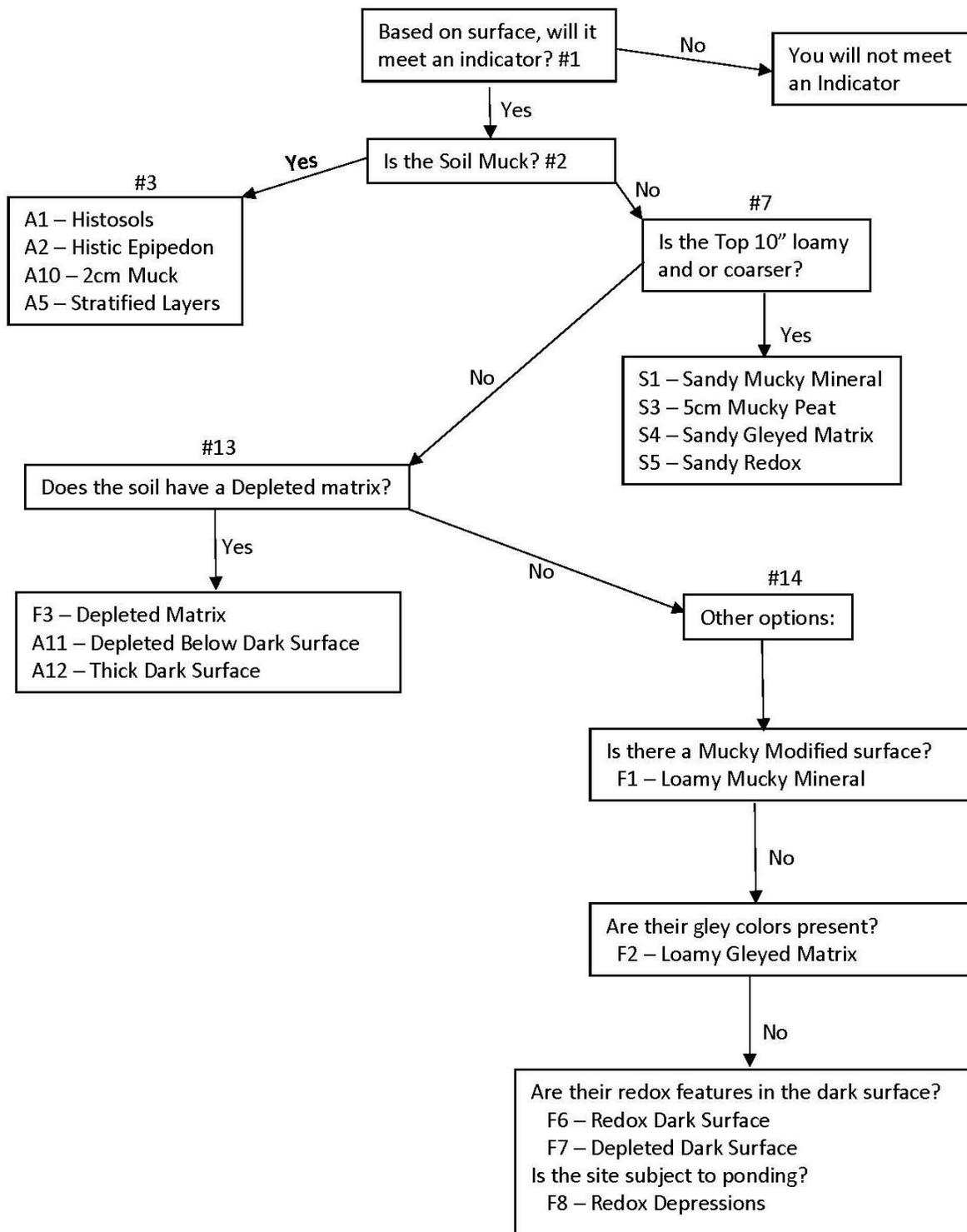
Silty clay – sic

Clay – c

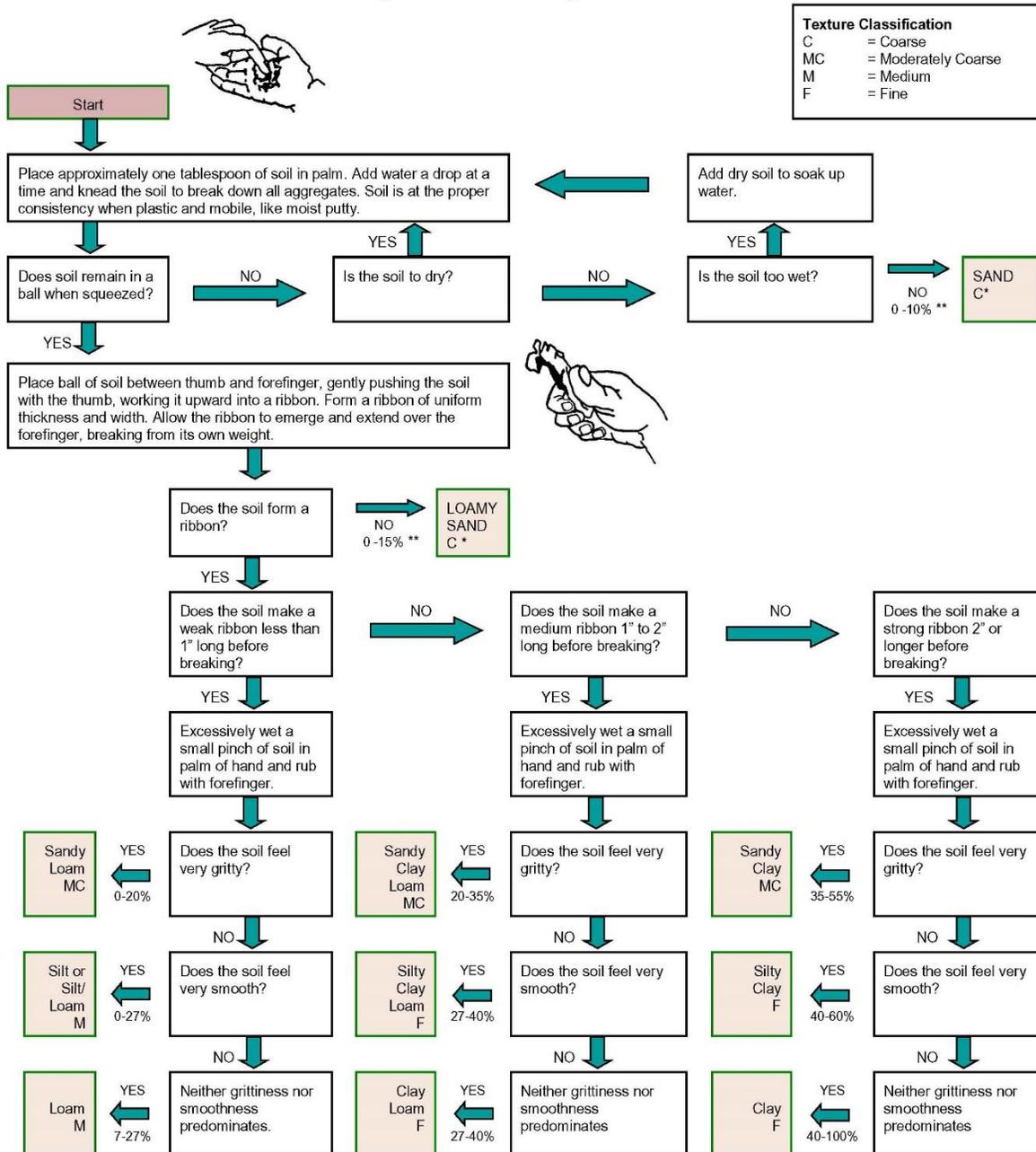


Source: *Field Book for Describing and Sampling Soils*, p. 2-38.

Indiana Hydric Soil Keys flowchart



Determining Soil Texture by the “Feel Method”



* Sand Particle size should be estimated (very fine, fine, medium, coarse) for these textures. Individual grains of very fine sand are not visible without magnification and there is a gritty feeling to a very small sample ground between the teeth. Some fine sand particles may be just visible. Medium sand particles are easily visible. Examples of sand size descriptions where one size is predominant are; very fine sand, fine sandy loam, loamy coarse sand.

** Clay percentage range.

Modified from: Thien, Steven J., Kansas state University, 1979 Jour. Agronomy education.

Determining Hydric Soil Indicators

Examples of collected layer data and the appropriate hydric soil indicators.

- a. Layer # 1 – 0 to 24" Black (10YR 2/1) muck, no redox concentrations
Layer # 2 – 24 to 34" Grayish brown (10YR 5/2) loamy/clayey soil
6% strong brown redox concentrations (7.5YR 5/6)

A1, A2, A10 (intended for accumulation of organic matter), A12 (would be hard to support if only indicator), can see this on slopes with ground water seeps

- b. Layer # 1 – 0 to 11" Very dark grey (10YR 3/1) loamy/clayey soil, no redox
Layer # 2 – 11 to 30" Black (10YR 2/1) muck, no redox
Layer # 3 – 30 to 50" Grayish brown (10YR 5/2) loamy/clayey soil
6% strong brown redox concentrations (7.5YR 5/6)

A1, doesn't meet A2 or A10, not surface horizons

- c. Layer # 1 – 0 to 14" Black (10YR 2/1) loamy/clayey soil, no redox
Layer # 2 – 14 to 18" Very dark gray (10YR 3/1) loamy/clayey soil
5% strong brown redox concentrations (7.5YR 4/6)
Layer # 3 – 18 to 25" Grayish brown (10YR 5/2) loamy/clayey soil
6% strong brown redox concentrations (7.5YR 5/6)

A12, not F6 (no redox in surface)

- d. Layer # 1 – 0 to 8" Very dark gray (10YR 3/1) loamy/clayey soil, no redox
Layer # 2 – 8 to 20" Grayish brown (10YR 5/2) loamy/clayey soil
6% strong brown redox concentrations (7.5YR 5/6)

F3, A11 (starting within 12" of soil surface)

- e. Layer # 1 – 0 to 11" Very dark gray (10YR 3/1) loamy/clayey soil, no redox
Layer # 2 – 11 to 25" Grayish brown (10YR 5/2) loamy/clayey soil
6% strong brown redox concentrations (7.5YR 5/6)

A11

- f. Layer # 1A – 3" Fibric material (duff) on surface
Layer # 1B – 0 to 6" Black (10YR 2/1) loamy/clayey soil
5% strong brown redox concentrations (7.5YR 5/6)
Layer # 2 – 6 to 14" Grayish brown (10YR 5/2) loamy/clayey soil
6% strong brown redox concentrations (7.5YR 5/6)

A11, F3 and F6

- g. Layer # 1 – 0 to 3” Very dark gray (10YR 3/1) sandy soil, no redox
- Layer # 2 – 3 to 25” Grayish brown (10YR 5/2) sandy soil
- 4% strong brown redox concentrations (7.5YR 5/6)

A11, S5 fails because of depth

- h. Layer # 1A – 3” Fibric material (duff) on surface
- Layer # 1B – 0 to 4” Black (10YR 2/1) loamy/clayey soil, no redox
- Layer # 2 – 4 to 14” Grayish brown (10YR 5/2) loamy/clayey soil

No redox documented, described.

- i. Layer # 1A – 3” Fibric material (duff) on surface
- Layer # 1B – 0 to 4” Dark grayish brown (10YR 3/2) loamy/clayey soil
- 5% strong brown redox concentrations (7.5YR 4/6)
- Layer # 2 – 4 to 14” Grayish brown (10YR 5/2) loamy/clayey soil
- 6% strong brown redox concentrations (7.5YR 5/6)

A11, F3 and F6

- j. Layer # 1 – 0 to 1” Black (10YR 2/1) muck, no redox
- Layer # 2 – 1 to 6” Dark grayish brown (10YR 3/2) sandy
- 5% strong brown redox concentrations (7.5YR 5/6)
- Layer # 3 – 6 to 14” Grayish brown (10YR 6/2) loamy/clayey soil
- 18% strong brown redox concentrations (7.5YR 5/6)

A10, F3, and S5, not A11 because of 3/2

- k. Layer # 1 – 0 to 24” Black (10YR 2/1) loamy/clayey, no redox

Move hole, keep digging

Hydric Indicator Tests

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Horizon	Depth	Matrix Color	%	Texture	Mottle Color	%
A	0-11	10YR 3/2	100	SiCL		
Btg	11-20	10YR 4/2	70	SiCL	10YR 5/6	30
Indicator(s): A11						
A	0-15	10YR 2/1	100	SiCL		
Btg	15-25	10YR 4/1	70	SiCL	10YR 5/6	30
Indicator(s): A12						
A	0-5	10YR 4/4	100	SiCL		
Btg	5-25	10YR 4/2	70	SiCL	10YR 5/6	30
Indicator(s): F3						
A	0-8	10YR 2/1	70	SiCL	10YR 5/6	30
Btg	8-20	10YR 4/2	100	SiCL		
Indicator(s): F3, (F8 - assuming that you are in a closed depression subject to ponding.)						
A	0-11	10YR 3/3	100	SiCL		
Btg	11-20	10YR 4/2	70	SiCL	10YR 5/6	30
Indicator(s): None, F3 - too deep, A11 or any other indicator - too brown in surface						
A	0-5	10YR 3/2	100	SiCL		
Btg	5-10	10YR 4/2	70	SiCL	10YR 5/6	30
Bt	10-20	10YR 5/2	100	CL		
Indicator(s): None, DM is not thick enough						
A1	0-10	10YR 2/1	100	SiCL		
A2	10-15	10YR 3/1	100	SiCL		
Btg	15-25	10YR 4/1	70	SiCL	10YR 5/6	30
Indicator(s): None, A12 - A2 horizon is too light						
A1	0-3	10YR 3/1	100	S		
Btg	3-15	10YR 4/2	70	S	10YR 5/6	30
Indicator(s): S5						
A	0-6	10YR 2/1	100	SL		
B	6-20	10YR 3/1	70	SiCL	10YR 5/6	30
Indicator(s): None, no DM						
Oa	0-9	10YR 2/1	100	Muck		
B	9-20	10YR 4/4	70	SiCL	10YR 5/6	30
Indicator(s): A2, also meets A10						
A	0-12	10YR 2/1	100	S		
B	12 +	10YR 5/1	100	S		
Indicator(s): None, no DM						
A	0-10	10YR 3/2	75	SiL	10YR 5/2	25
B	10-15	10YR 4/3	70	CL	10YR 5/6	30
Indicator(s): F7						